Nearby Hipparcos Eclipsing Binaries for Color – Surface Brightness Calibration

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ABSTRACT

This paper contains the list of Hipparcos eclipsing binaries that fulfill the following conditions: the star is classified in the *Hipparcos Catalogue* as EA-type eclipsing binary and its parallax is either larger than 5 mas or it is five times larger than its mean error. An eclipsing binary with known distance and with photometric and double-line spectroscopic orbits determined can be used in the process of calibrating the relation between the stellar surface brightness and the color that is crucial for the method of the distance determination by means of eclipsing binaries. This list is being published in order to draw attention of observers using small telescopes to these bright, potentially useful and in the most cases poorly observed objects. The advantages of the eclipsing binary method of the distance determination are discussed.

Key words: *binaries: eclipsing – Stars: fundamental parameters – Stars: distances*

1 Introduction

The double-line eclipsing binaries are now often considered to be one of the most promising distance indicators (*e.g.*, Paczyński 1997). The method is largely geometrical with only a single relation that needs to be calibrated. This is the relation between the stellar surface brightness and whatever data that can be obtained to judge about the stellar temperature.

The method itself is pretty much obvious once the spectroscopic and photometric orbits of the binary system are at hand. Yet its origins are not commonly known so that it happens once and again that somebody rediscovers it, claiming that he has found an original method. That has motivated us to write Section 2 where we describe how this nearly hundred years old method was developed.

Section 3 is devoted to explaining why it is important to derive the calibration of the surface brightness – color relation exclusively from observations of eclipsing binaries with known distances.

Finally in Section 4 we present the list with a selection of nearby Hipparcos eclipsing binaries.

2 Historical Outlook

The photometric orbit of an eclipsing binary gives us relative radii of both stellar components expressed in terms of their separation and in addition an orbital inclination. The double-line spectroscopic orbit when combined with the orbital inclination that comes out from the photometric orbit results with masses of both components and metric value of the system dimension.

When the distance to the binary system is known then the angular sizes of both components are also known and knowing the apparent magnitudes of both components which come out from the photometric solution makes it possible to calculate surface brightness for each of components. So, known parallax of an eclipsing binary can be used to obtain direct measurement of the surface brightness.

On the other hand if one knows the value of surface brightness of an eclipsing binary component and if also the photometric and double-line spectroscopic orbits for that eclipsing binary are available then it is possible to calculate distance to the binary system.

First applications of this two-way inference were made in the "distance to surface brightness" direction. The necessary observational data started to be available about hundred years ago. Vogel (1890) was first to determine radial velocity orbital variations for Algol and thus he obtained the first single-line spectroscopic orbit for any eclipsing variable. He is also credited with the first determination of the stellar radius, expressed in that case in miles. Stebbins (1910), starting observations with his newly developed selenium cell photometer, obtained the first accurate photometric light curve of Algol. Combining the photometric orbit based on his observations and the single-line spectroscopic orbit of Schlesinger and Curtiss (1908) and using average of three then existing determinations of trigonometric parallax (70 mas as compared with the Hipparcos value of 35 mas) he was able to estimate values of surface brightness for both components expressed in units of the solar surface brightness. With a single-line spectroscopic orbit these estimates depended on an assumed mass ratio of Algol components. For two plausible assumptions about mass ratio the resulting surface brightness differed by a factor of three.

β Aur was the first eclipsing binary with double-line spectroscopic orbit (Baker 1910) and with good photometric light curve (Stebbins 1911). The only thing that marred this otherwise excellent situation was low accuracy of the available data on the trigonometric parallax. Stebbins (1911) was analyzing this set of data under the assumption that the parallax is smaller than 30 mas and therefore he was able to determine only lower limits for surface brightness of both components. This limitation was overcome by Russell, Dugan and Steward (1927) who used parallax equal to 34 mas and obtained surface brightness of both components expressed in units of an equivalent effective temperature. It is worth mentioning here that the Hipparcos parallax for β Aur is equal to 40 mas.

Gaposchkin (1933) made an attempt to determine effective temperatures for 30 eclipsing binaries with measured parallaxes even though in most cases these parallaxes were smaller than corresponding measurements errors. This work was criticized (Woolley 1934, Pilowski 1936) on obvious reason of using nonuniform and largely unreliable data. Kopal (1939) repeated the work of Gaposchkin using data on radial velocities and proper motions available for 39 systems and resorting to the statistical parallax method after he had divided his data into three groups depending on spectral types. He also used two binary systems with trigonometric parallaxes and two with group parallaxes. Thus before the year 1940 there already existed a crude independent calibration of the surface brightness expressed in terms of temperature as a function of spectral type, based exclusively on the eclipsing binaries.

Up to now we presented the "distance to surface brightness" inference. It is difficult to imagine that all the involved individuals were not aware of the possibilities and potentials of the reverse inference "surface brightness to distance". In any case, we have not encountered any reference to that possibility prior to the papers by Gaposchkin (1938, 1940) but even in that case the problem of the distance determination was not stated openly. The luminosities of eclipsing binary components were calculated with the help of system dimensions and with temperatures judged from the spectral types. A trivial step of calculating distances by comparing luminosities with apparent magnitudes was not done – as it was not done in much newer and much more accurate analysis by Andersen (1991). Gaposchkin stressed the fact that the calibration he had applied was based exclusively on the eclipsing binaries data.

For nearby Galactic stars the quantities that are interesting are masses, sizes, luminosities and temperatures. Once we know these quantities it is not really relevant, if a star is 100 or 200 pc away. The situation is much

different when we have to do with eclipsing variables in extragalactic nebulae. In that case it provides opportunity to determine the distance of the host external galaxy. Gaposchkin (1962) determined distance to an eclipsing variable in the M31 nebula. He did it using very crude form of the method but undoubtly the distance determination was the main aim of that paper and certainly that was the "surface brightness to distance" inference. Several papers with the determination of distances of eclipsing variables in M31, LMC, and SMC followed (Gaposchkin 1968, 1970, Dworak 1974, de Vaucouleurs 1978). Attention was also directed to the Galactic eclipsing binary systems. Dworak (1975) and Brancewicz and Dworak (1980) prepared a catalog of more than 1000 eclipsing variables for which they made crude determination of parallaxes.

It was a common property of both Gaposchkin and Dworak determinations of the distance that they did not stick to the clean case with a good photometric orbit and a good double-line spectroscopic orbit supplemented with information about temperatures of components. Eclipsing binaries offer plenty of opportunities for estimating the mass ratio of components in the case of single-line spectrum and even for estimating masses without any spectroscopic data. This kind of mixed accuracy data could be useful *e.g.*, for selecting candidates for parallax observations by Hipparcos (Dworak and Oblak 1987, 1989) but it has not helped to the method's reputation.

Originally it was the stellar spectral type that was used for estimating the temperature and consequently the surface brightness what needed also the knowledge of bolometric correction. Barnes and Evans (1976) found that the $V-R$ color can serve as an excellent tool in that context without any need to know the spectral types, effective temperatures or bolometric corrections. All the relevant informations are compressed into so called surface brightness parameter F_V that can be directly determined from observations. In particular, for stars later than the spectral type A0 the plot of surface brightness parameter F_V *vs.* the $V-R$ color index is parallel to the reddening line what obviates the need for precise reddening determination. The Barnes–Evans finding was soon applied by Lacy (1977, 1979) to the eclipsing binary distance determination.

In an early calibration Barnes, Evans and Moffett (1978) could only use three eclipsing binaries as calibrators, namely β Aur, YY Gem and CM Dra so that the calibration was based mainly on stars with interferometrically determined angular sizes supplemented with data from lunar occultations. Popper (1980) has modified slightly the calibration of Barnes, Evans and Moffett. He allowed deviations from linearity in the relation between the

surface brightness parameter and the color index and beside the recommended by Barnes and Evans $V-R$ index he also calibrated $B-V$ and Strömgren $b-y$ indices. Also separate calibrations for dwarfs and giants were given. Recent calibrations of the Barnes–Evans relation concerned late type stars (Fouqué and Gieren 1997, Beuermann *et al.* 1999) or stars later than A0 (Di Benedetto 1998).

The new Hipparcos data were used by Popper (1998) for comparison with his old (Popper 1980) calibration of the relation between the surface brightness parameter and the $B-V$ color index. He selected 14 detached eclipsing binaries closer than 125 pc with the mean errors of the Hipparcos parallax of 10% or less and with good photometric and spectroscopic data. The outcome of the comparison is that the majority of objects lie on or slightly above the calibration curve but 5 binary systems are situated clearly below it. Popper suggested that these 5 outliers may have depressed surface brightness due to spotted character of their surfaces. Ribas *et al.* (1998) made another selection of eclipsing binaries with Hipparcos parallaxes. As compared to the Popper selection they relaxed the distance accuracy requirement (relative errors in the trigonometric parallax smaller than 20%) but sticked to the high accuracy of the object dimension determination. The resulting sample of 20 stars contains only 5 objects common with Popper sample. Ribas *et al.* stopped at the calculation of the effective temperatures for all components of these 20 binaries and did not proceeded with collecting the color indices and constructing the surface brightness parameter *vs.* color index diagram. These two papers give an idea what kind of photometric and spectroscopic data is available right now. About ten times larger number of eclipsing variables have trigonometric parallaxes measured by Hipparcos with accuracy better than 20%, many of them discovered as eclipsing variables by Hipparcos as well, but majority of them lacking sufficiently good photometric and spectroscopic data.

3 Motivation for Using More Eclipsing Binaries as Calibrators

When one aims to determine accurate distances with the help of eclipsing binaries then the calibration of the surface brightness parameter *vs.* color index should be as good as possible and free as much as possible from any systematic errors.

Angular sizes determined with the help of interferometry (Hanbury Brown *et al.* 1974, Davis 1997), lunar occultations (Ridgway *et al.* 1980, Richichi

1977) or infrared flux method (Blackwell and Shallis 1977, Blackwell and Lynas-Gray 1994) are plagued by the presence of limb darkening. They are effective sizes corresponding to some effective surface brightness. One can correct such effective sizes having some idea about the degree of limb darkening either from theoretical models of stellar atmospheres or from observations of limb darkening in eclipsing binaries. In any case the need to correct for the limb darkening makes the calibration less direct. When analyzing light curve of an eclipsing binary astronomer can determine also limb darkenings of the components so that the component sizes should be free from limb darkening uncertainty. Recent progress in the interferometric techniques opens the possibility to determine limb-darkened angular diameters of stars (Benson *et al.* 1997, Hummel *et al.* 1998, Pauls *et al.* 1998, Armstrong *et al.* 1998, Hajian *et al.* 1998) also by means of interferometry. A comparison of limb-darkening resulting from these two techniques can be seen as an additional cross-check of the calibration.

Surface brightness dependence on gravity and metallicity is not particularly strong but striving for the best accuracy the corresponding corrections should be calibrated and applied. As these corrections are not expected to be large it should be enough to determine the shape of the functional dependence of corrections on gravity and metallicity with the help of atmospheric models but the zero point, or more precisely the dependence of the surface brightness parameter on color for solar metallicity main sequence stars, should be determined by comparison with the calibrating data. One of advantages of the eclipsing binary data is that surface gravity is also accurately known in that case.

We think that the optimal case is when the eclipsing binary method of distance determination is calibrated exclusively with the use of eclipsing binaries with geometrically determined distances. This has been made feasible by publication of the Hipparcos trigonometric parallaxes for many nearby eclipsing binaries.

Beside the use for distance determination such calibration can serve as an independent check for the data on fundamental stellar parameters resulting from other methods of stellar angular size determination including model calculations.

In the following Section we present the list of nearby Hipparcos eclipsing binaries. For most of them there are only scanty observational data available. Some of them are not good for being reliable calibrators because of the light curve characteristics, RS CVn type variability, small depths of eclipses or because of being semi-detached system but rejections based on

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Hipparcos Eclipsing Binaries of the EA or EA: type with distance smaller than 200 pc or with parallax 5 times larger than its mean error.

HIP Number		Name	Var type	Spectral type	Max [mag]	Min [mag]	P [days]	E		π [mas]	σ_π [mas]	RA 2000.0	Dec 2000.0
270	*	V397 Cep	EA	A2	7.393	7.811	2.08684	2448501.180	!	4.70	0.63	$00^h03^m24^s.0$	$+73^\circ10'28''$
817	*	V342 And	EA	A3+...	7.578	7.723	2.63934	2448500.6933	!	7.21	1.55	$00^h10^m03^s.2$	$+46^\circ23'25''$
1233	*	V348 And	EA	B9	6.750	6.900	5.5392	2448504.070	!	4.05	0.76	$00^h15^m17^s.8$	$+44^\circ12'12''$
1550		TV Cas	EA/SD	B9V	7.264	8.277	1.81257	2448501.3500		3.93	0.76	$00^h19^m18^s.7$	$+59^\circ08'21''$
3454	*	V355 And	EA	F5	7.585	7.624			!	8.22	1.74	$00^h44^m11^s.2$	$+46^\circ14'08''$
3572		YZ Cas	EA/DM	A2IV	5.673	6.060	4.4673	2448500.883		11.24	0.55	$00^h45^m39^s.1$	$+74^\circ59'17''$
4157		CF Tuc	EA/RS	G2/5V + F0	7.660	8.020	2.79765	2448502.560		11.60	0.65	$00^h53^m07^s.2$	$-74^\circ39'06''$
4843		U Cep	EA/SD	G8III	6.855	> 9.400	2.49307	2448500.598		4.84	0.54	$01^h02^m18^s.3$	$+81^\circ52'32''$
5348		ζ Phe	EA/DM	B6V + B0V	3.910	4.390	1.66974	2448501.433		11.66	0.77	$01^h08^m23^s.1$	$-55^\circ14'45''$
5980		UV Psc	EA/D:	G2	9.050	9.900	0.86105	2448500.480		15.87	1.32	$01^h16^m55^s.1$	$+06^\circ48'42''$
7323	*	BH Scl	EA	A5V	7.921	8.150	2.04507	2448500.45	!	5.33	0.94	$01^h34^m18^s.4$	$-27^\circ21'47''$
7372		BB Scl	EA	K3V	7.233	7.437	0.47653	2448500.102	!	42.29	1.47	$01^h35^m01^s.0$	$-29^\circ54'38''$
8115	*	V773 Cas	EA	A3V	6.212	6.304	1.29366	2448500.9310	!	12.63	0.77	$01^h44^m17^s.9$	$+57^\circ32'12''$
9230		CI Eri	EA/SD:	F8V	9.750	10.900	1.23819	2448500.828	!	9.49	1.99	$01^h58^m38^s.5$	$-53^\circ31'39''$
9383		X Tri	EA/SD	A7V	8.850	11.150	0.97154	2448500.966		6.03	1.27	$02^h00^m33^s.7$	$+27^\circ53'19''$
10099	*	DP Cet	EA	A2	6.850	7.050	3.17480	2448502.600	!	11.31	0.92	$02^h09^m51^s.3$	$+03^\circ46'10''$
10579	*	DS Cet	EA:	G3V	8.970	9.340			!	7.23	3.71	$02^h16^m09^s.3$	$-21^\circ00'30''$
10961		V505 Per	EA	F5	6.950	7.500	4.22202	2448501.012		15.00	0.84	$02^h21^m12^s.9$	$+54^\circ30'36''$
12657	*	AL Ari	EA	F8	9.308	9.656			!	9.54	1.76	$02^h42^m36^s.4$	$+12^\circ44'08''$
12805	*	V405 Cep	EA	A2	8.753	8.958	1.37374	2448500.968	!	4.36	0.87	$02^h44^m34^s.2$	$+79^\circ11'56''$
13133		RZ Cas	EA/SD	A3V	6.280	7.870	1.19525	2448500.037		15.99	0.62	$02^h48^m55^s.5$	$+69^\circ38'03''$
14273		CW Eri	EA/DM	F2V	8.430	8.900	2.72837	2448500.602		5.95	1.25	$03^h03^m59^s.9$	$-17^\circ44'16''$
14568	*	AE For	EA	K4	10.323	10.895	0.91824	2448500.6581	!	32.10	1.78	$03^h08^m06^s.5$	$-24^\circ45'36''$
14576		β Per	EA/SD	B8V	2.080	> 3.220	2.86730	2448500.290		35.14	0.90	$03^h08^m10^s.1$	$+40^\circ57'20''$
15003		LX Per	EA/AR	G5IV + G5IV	8.320	9.150	8.03821	2448503.140		10.00	1.03	$03^h13^m22^s.3$	$+48^\circ06'32''$

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HIP Number		Name		Var type	Spectral type	Max [mag]	Min [mag]	P [days]	E		π [mas]	σ_π [mas]	RA 2000.0	Dec 2000.0
15092		TZ For		EA/GS	G2V	6.998	7.040	75.66750	2445032.61		5.86	0.96	$03^h14^m40^s.1$	$-35^\circ33'28''$
15193		V572 Per	*	EA	A0	6.504	> 6.790	1.21317	2448500.5700	!	7.90	1.03	$03^h15^m48^s.6$	$+50^\circ57'22''$
15811		RT Per		EA/SD	F0V	10.600	>12.000	0.84940	2448500.509		5.56	2.17	$03^h23^m40^s.4$	$+46^\circ34'36''$
16083	*	ξ Tau		EA:	B9Vn	3.701	3.786			!	14.68	1.01	$03^h27^m10^s.1$	$+09^\circ43'58''$
17024	*	V1125 Tau		EA	G0	8.774	9.033			!	20.54	1.15	$03^h38^m58^s.7$	$+00^\circ47'48''$
17333	*	CU Cam		EA	A0	7.940	8.180	3.3637	2448502.523	!	6.99	0.78	$03^h42^m36^s.0$	$+77^\circ10'13''$
17441		GH Eri	*	EA	F2V	9.016	9.605	0.72238	2448500.450	!	7.52	0.93	$03^h44^m13^s.0$	$-41^\circ16'46''$
17962		V471 Tau		EA	K0Vea + DA	9.561	9.633	0.52118	2445612.38		21.37	1.62	$03^h50^m24^s.9$	$+17^\circ14'48''$
18724		λ Tau		EA/DM	B3V + A	3.340	> 3.500	3.95295	2448501.550		8.81	0.99	$04^h00^m40^s.8$	$+12^\circ29'25''$
19062	*	GT Eri		EA	F0V	8.621	9.121	0.90138	2448500.8140	!	6.79	1.08	$04^h05^m06^s.3$	$-31^\circ10'11''$
19571	*	GW Eri		EA	A1V + (F/G)	5.840	> 6.130	3.6586	2448502.817		13.06	0.72	$04^h11^m36^s.2$	$-20^\circ21'23''$
20657	*	VW Ret		EA	F0V	8.762	9.286	2.08470	2448500.6460	!	3.67	0.70	$04^h25^m35^s.4$	$-60^\circ45'25''$
20806	*	HH Eri		EA	G8/K0V + F/G	8.502	8.847			!	20.90	2.04	$04^h27^m31^s.9$	$-17^\circ06'31''$
20896	*	DI Cam		EA	F8	7.850	8.090	4.1659	2448501.040	!	10.14	0.67	$04^h28^m42^s.3$	$+79^\circ42'07''$
21213		RZ Cae	*	EA:	A4V	7.680	7.820			!	7.45	0.97	$04^h33^m01^s.5$	$-38^\circ17'00''$
21334		TY Tau		EA	K0V	11.953	12.563	1.07736	2448500.860	!	6.01	6.32	$04^h34^m43^s.3$	$+15^\circ15'54''$
21604		HU Tau		EA/SD:	B8V	5.857	6.708	2.05631	2448501.1857		9.03	0.84	$04^h38^m15^s.8$	$+20^\circ41'05''$
22000		RZ Eri		EA/DS	Am comp SB	7.880	9.110	39.28238	2448523.56		5.40	1.29	$04^h43^m45^s.8$	$-10^\circ40'56''$
22229	*	AL Dor		EA	F8V	7.800	8.120	1.20696	2448500.0360	!	15.34	0.61	$04^h46^m52^s.2$	$-60^\circ36'14''$
22498	*	DP Cam		EA:	K7	9.905	10.438			!	42.59	17.78	$04^h50^m24^s.8$	$+63^\circ20'00''$
23453		ζ Aur		EA/GS	K4II comp	3.842	3.876	972.16000	2427692.83		4.14	0.81	$05^h02^m28^s.7$	$+41^\circ04'33''$
24552	*	V1366 Ori		EA:	A0	9.872	10.644			!	6.10	1.63	$05^h16^m00^s.5$	$-09^\circ48'35''$
24663		CD Tau		EA/D	F7V	6.790	7.310	3.43514	2448503.401		13.66	1.64	$05^h17^m31^s.2$	$+20^\circ07'56''$
24710	*	VW Col		EA	K3V	9.240	10.330			!	19.09	3.25	$05^h18^m00^s.4$	$-27^\circ29'26''$
24740		AR Aur		EA	B9.5V	6.110	6.780	4.13470	2448503.180		8.20	0.78	$05^h18^m18^s.9$	$+33^\circ46'03''$

Table 1

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HIP Number		Name	Var type	Spectral type	Max [mag]	Min [mag]	P [days]	E		π [mas]	σ_π [mas]	RA 2000.0	Dec 2000.0
24836	*	DV Cam	EA	B5V	6.100	6.300	1.52950	2448501.0860	!	3.71	0.73	$05^h19^m27^s.8$	$+58^\circ07'03''$
25760		UX Men	EA/DM	F8V	8.320	8.970	4.18110	2448500.880		9.93	0.62	$05^h30^m03^s.1$	$-76^\circ14'55''$
25776		TZ Men	EA/D	A1V	6.180	6.700	8.5702	2439190.34		9.35	0.50	$05^h30^m13^s.9$	$-84^\circ47'07''$
26760	*	AV Dor	EA	F0V	9.670	10.090	1.09480	2448500.4260	!	4.90	0.88	$05^h41^m04^s.9$	$-61^\circ51'28''$
27309		V1380 Ori	*EA	B5	9.760	10.610	5.8130	2448501.920	!	5.70	4.95	$05^h47^m07^s.9$	$+00^\circ17'56''$
28360		β Aur	EA	A2V	1.890	1.980	3.96004	2448500.910		39.72	0.78	$05^h59^m31^s.8$	$+44^\circ56'51''$
28537		RW Gem	EA/SD:	B6V comp SB	9.610	11.840	2.86550	2448502.160		10.53	2.47	$06^h01^m28^s.1$	$+23^\circ08'28''$
29455	*	IO CMa	EA	A1m A5-F2	8.460	8.707	2.87211	2448500.9091	!	6.47	0.77	$06^h12^m22^s.4$	$-30^\circ28'54''$
30270	*	V454 Aur	EA	F8	7.740	8.170	3.20570	2448502.200	!	14.39	0.94	$06^h22^m03^s.1$	$+34^\circ35'51''$
30651		RR Lyn	EA/DM	A3m	5.590	5.980	9.9451	2448509.050		12.01	0.97	$06^h26^m25^s.9$	$+56^\circ17'06''$
30806	*	V722 Mon	EA	F5	7.838	7.994			!	7.67	1.14	$06^h28^m20^s.4$	$-00^\circ43'46''$
30878	*	V455 Aur	EA	F2	7.328	7.590			!	13.73	0.89	$06^h28^m55^s.0$	$+52^\circ07'33''$
31017	*	KL CMa	EA	B8V	6.730	6.970	1.76220	2448501.5700	!	4.51	0.76	$06^h30^m29^s.8$	$-14^\circ57'16''$
31173		WW Aur	EA/DM	A3m + A3m	5.820	> 6.300	2.52502	2448500.9150		11.86	1.06	$06^h32^m27^s.2$	$+32^\circ27'18''$
32015		SV Cam	EA/DW	G5V	9.352	10.084	0.59308	2448500.4320		11.77	1.07	$06^h41^m18^s.9$	$+82^\circ16'04''$
32374	*		EA:	M2III	7.202	7.287			!	2.83	0.52	$06^h45^m25^s.3$	$-65^\circ02'39''$
32900		HS Aur	EA/DM	G8V+...	10.231	10.318	9.81538	2427397.53		10.05	2.21	$06^h51^m18^s.5$	$+47^\circ40'24''$
33487	*	V358 Pup	EA	G5V	9.304	9.540			!	12.21	2.45	$06^h57^m39^s.1$	$-41^\circ17'40''$
34003		VV Mon	EA/RS	K0IV + G2	9.510	>10.250	6.05083	2448503.390		5.59	1.46	$07^h03^m18^s.3$	$-05^\circ44'16''$
34659	*	V362 Pup	EA:	A2Vs	7.516	7.626			!	5.42	1.02	$07^h10^m39^s.6$	$-41^\circ15'54''$
35447		V365 Pup	*EA	A0V	7.797	7.912			!	3.80	0.68	$07^h19^m06^s.6$	$-35^\circ11'03''$
35487		R CMa	EA/SD	F2III/IV	5.780	6.417	1.13596	2448500.3328		22.71	0.80	$07^h19^m28^s.1$	$-16^\circ23'42''$
36608		PS Pup	EA	B8V	6.550	6.710	1.32110	2448500.5680	!	3.69	0.68	$07^h31^m42^s.7$	$-35^\circ53'16''$
38167		V397 Pup	*EA	B9V	5.910	6.090	3.00455	2448502.1900	!	6.82	0.53	$07^h49^m14^s.6$	$-35^\circ14'36''$
41361		NO Pup	EA/KE:	B9IV/V	6.050	6.610	1.25689	2448500.930		5.32	0.87	$08^h26^m17^s.7$	$-39^\circ03'32''$

Table 1

Continued

HIP Number		Name	Var type	Spectral type	Max [mag]	Min [mag]	P [days]	E		π [mas]	σ_π [mas]	RA 2000.0	Dec 2000.0
41564		LO Hya	EA	A5m	6.479	6.605				11.73	0.94	$08^h28^m29.^s2$	$-02^\circ31'02''$
41834		VZ Hya	EA/DM	F5V + F5V	9.030	9.770	2.90430	2448500.174		5.03	1.34	$08^h31^m41.^s4$	$-06^\circ19'08''$
42794		RS Cha	EA+DSC	A7V	6.090	6.750	1.66987	2448501.6500		10.23	0.46	$08^h43^m12.^s3$	$-79^\circ04'12''$
42951	*	MX Hya	EA	F2+...	6.520	7.010			!	11.50	2.71	$08^h45^m20.^s8$	$-02^\circ36'04''$
44164		TY Pyx	EA/D/R	G5V	6.960	7.590	3.19858	2448500.048		17.91	0.74	$08^h59^m42.^s8$	$-27^\circ48'58''$
44349		WY Cnc	EA/SD	G8V	9.540	10.230	0.82937	2448500.7380		11.76	1.72	$09^h01^m55.^s5$	$+26^\circ41'23''$
45079		PT Vel	*EA	A0V	7.046	> 7.600	1.80201	2448500.7150	!	6.20	0.62	$09^h10^m57.^s7$	$-43^\circ16'03''$
45887	*	NY Hya	EA	G5	8.650	9.020	1.59140	2448500.0320	!	10.15	1.27	$09^h21^m22.^s8$	$-06^\circ40'20''$
46002	*	NZ Hya	EA	F7/F8V	8.280	8.780			!	12.47	2.05	$09^h22^m56.^s6$	$-15^\circ29'44''$
46881		S Vel	EA/SD	A5Ve comp SB	7.790	> 9.650	5.93365	2448504.480		6.61	0.78	$09^h33^m13.^s2$	$-45^\circ12'31''$
48054		KN Vel	*EA	A2IV(m)	6.560	6.720	2.72290	2448501.2500	!	8.07	0.62	$09^h47^m44.^s0$	$-49^\circ56'36''$
50966		HS Hya	EA/D	F5V	8.160	8.500	1.56804	2448501.330		11.04	0.88	$10^h24^m36.^s8$	$-19^\circ05'33''$
51683	*	PX Hya	EA:	F2V	8.473	8.572			!	5.00	1.12	$10^h33^m30.^s7$	$-20^\circ10'52''$
52066		UV Leo	EA/DW	G0V	9.020	9.680	0.60009	2448500.560		10.85	1.16	$10^h38^m20.^s8$	$+14^\circ16'04''$
52381		RZ Cha	EA/DM	F5V + F5	8.100	8.560	2.83208	2448501.810		5.43	0.63	$10^h42^m24.^s2$	$-82^\circ02'14''$
52465	*	UW LMi	EA	G0V	8.446	8.674	3.8750	2448501.163	!	7.73	1.08	$10^h43^m30.^s2$	$+28^\circ41'10''$
53487	*	QR Hya	EA	G1V	8.508	8.690			!	10.58	0.96	$10^h56^m31.^s2$	$-34^\circ33'50''$
53806	*	V359 Vel	EA	B9V	7.580	7.840	4.5350	2448500.360	!	3.65	0.73	$11^h00^m33.^s4$	$-51^\circ56'50''$
53905	*	TW Crt	EA	F5V	8.390	8.720	0.94430	2448500.7180	!	11.35	1.34	$11^h01^m48.^s0$	$-21^\circ50'31''$
54711	*	FK Leo	EA	F5III	8.590	8.850	1.73720	2448501	!	7.13	1.15	$11^h12^m05.^s5$	$+14^\circ18'23''$
54766	*	FM Leo	EA	F8	8.542	8.857			!	8.35	1.17	$11^h12^m45.^s2$	$+00^\circ20'53''$
54807		TT Hya	EA/SD	A1III	7.298	> 9.100	6.9534	2448500.466		6.50	0.95	$11^h13^m12.^s5$	$-26^\circ27'54''$
56379	*	KR Mus	EA	B9Vne	6.678	6.873			!	9.67	0.60	$11^h33^m25.^s5$	$-70^\circ11'41''$
58579	*	TX Crv	EA:	G0	8.080	8.600			!	10.83	2.30	$12^h00^m47.^s6$	$-12^\circ09'27''$
59229		V788 Cen	EA	A3III	5.812	6.011	4.9664	2448502.225	!	9.99	0.70	$12^h08^m53.^s8$	$-44^\circ19'33''$

T a b l e 1

Continued

HIP Number		Name		Var type	Spectral type	Max [mag]		Min [mag]	P [days]	E		π [mas]	σ_π [mas]	RA 2000.0	Dec 2000.0
60812	*	KP Vir		EA	A2	8.420		8.790	2.27720	2448501.9400	!	5.49	1.61	$12^h27^m51\overset{s}{.}0$	$-10°10'02''$
61006	*	FK Dra		EA	K0	9.300		9.790	2.00072	2448501.6300	!	9.00	0.96	$12^h30^m11\overset{s}{.}6$	$+63°53'21''$
61882	*	LL Mus		EA	A0V	8.930		9.340	1.36584	2448501.0200	!	4.82	0.94	$12^h40^m51\overset{s}{.}0$	$-67°44'24''$
61910		VV Crv	*	EA	F3IV	5.190		5.340	3.14500	2448502.1700	!	11.72	1.90	$12^h41^m16\overset{s}{.}0$	$-13°00'50''$
62801	*	LQ Mus		EA	F5V	9.140	>	9.750	4.0070	2448503	!	7.10	1.03	$12^h52^m08\overset{s}{.}2$	$-68°54'01''$
63592		UY Vir		EA/DM	A9IV	8.020		8.920	1.99451	2448501.260		7.58	0.92	$13^h01^m53\overset{s}{.}4$	$-19°46'28''$
64120		HY Vir		EA	F2	7.880		8.220	2.73233	2448500.5700		6.13	0.87	$13^h08^m29\overset{s}{.}9$	$-02°40'45''$
64293		RS CVn		EA/AR	K2III	8.140		9.410	4.79789	2448503.960		9.25	1.06	$13^h10^m36\overset{s}{.}9$	$+35°56'05''$
64607	*	LN Vir		EA:	M0III	5.752		5.799			!	6.43	0.80	$13^h14^m31\overset{s}{.}2$	$+11°19'54''$
64661		η Mus	*	EA	B8V	4.750		4.860	2.39630	2448501.7300		8.04	0.59	$13^h15^m15\overset{s}{.}0$	$-67°53'40''$
66683	*	LX Mus		EA:	F5V	8.852		9.030			!	7.53	0.80	$13^h40^m11\overset{s}{.}6$	$-74°04'45''$
68064		ZZ Boo		EA/DM	F2V	6.860		6.895	4.99174	2438565.92		8.88	0.78	$13^h56^m09\overset{s}{.}6$	$+25°55'07''$
68258		BH Vir		EA/DW	F8V	9.630	>	10.300	0.81687	2448500.2450		7.94	1.50	$13^h58^m24\overset{s}{.}9$	$-01°39'39''$
68384	*	CX CVn		EA	F8	9.440		9.690	1.64096	2448502	!	8.43	2.30	$13^h59^m55\overset{s}{.}7$	$+28°09'40''$
68692		AT Cir		EA/DM	A5IV/Vs	7.699	>	8.200	3.25728	2448503.105	!	5.95	0.88	$14^h03^m38\overset{s}{.}3$	$-66°44'07''$
69211		V353 Hya	*	EA	F5V	7.515		7.649			!	8.29	1.05	$14^h10^m12\overset{s}{.}4$	$-25°24'02''$
69781		V636 Cen		EA/DM:	F8/G0V	8.790		9.000	4.2839	2448501.692	!	15.36	1.12	$14^h16^m57\overset{s}{.}9$	$-49°56'42''$
70287	*	DV Boo		EA	A2	7.600		7.840	1.26086	2448500.4400	!	7.38	0.92	$14^h22^m49\overset{s}{.}7$	$+14°56'20''$
71487		BW Boo		EA/DM	F0V	7.140		7.420	3.33282	2448501.620		7.80	0.76	$14^h37^m08\overset{s}{.}8$	$+35°55'47''$
73473		δ Lib		EA/SD	B9.5V	4.924		5.933	2.32737	2448502.1655		10.72	0.91	$15^h00^m58\overset{s}{.}4$	$-08°31'08''$
74127	*	IL Lib		EA	F2	7.639		7.764			!	9.32	1.22	$15^h08^m56\overset{s}{.}7$	$-11°47'26''$
74866		TY UMi	*	EA	F0	7.790		8.236	1.72480	2448500.2764	!	9.10	0.59	$15^h17^m57\overset{s}{.}5$	$+83°51'34''$
74950		GG Lup		EA	B9V	5.552	>	6.070	1.84962	2448500.5500		6.34	0.72	$15^h18^m56\overset{s}{.}4$	$-40°47'17''$
76196		TW Dra		EA/SD	A5 comp SB	7.406		8.963	2.80689	2448500.9687		8.21	1.03	$15^h33^m51\overset{s}{.}0$	$+63°54'26''$
76267		α CrB		EA	A0V	2.213		2.290	17.35991	2423163.77		43.65	0.79	$15^h34^m41\overset{s}{.}2$	$+26°42'54''$

Table 1

Continued

HIP Number		Name	Var type	Spectral type	Max [mag]	Min [mag]	P [days]	E		π [mas]	σ_π [mas]	RA 2000.0	Dec 2000.0
76658		RW CrB	EA/SD:	A8V SB	10.130	10.900	0.72641	2448500.3490		5.11	1.65	$15^{h}39^{m}15.^{s}2$	$+29^\circ37'20''$
78523	*	V1041 Sco	EA	F6V	8.937	9.258	2.18694	2448500.5500	!	11.61	2.95	$16^{h}01^{m}51.^{s}5$	$-28^\circ22'26''$
81519		WW Dra	*EA/AR	G2IV + K0IV	8.330	8.980	4.62962	2448502.010		8.67	1.24	$16^{h}39^{m}04.^{s}0$	$+60^\circ41'59''$
81530		OT Aps	*EA	B9.5IV	7.980	8.340	2.42660	2448501.6000	!	4.54	0.79	$16^{h}39^{m}09.^{s}3$	$-75^\circ29'19''$
81589		R Ara	EA/DM:	B9IV/V	6.560	> 7.200	4.42507	2448501.290		12.44	2.03	$16^{h}39^{m}44.^{s}7$	$-56^\circ59'40''$
82080		ε UMi	EA	G5IIIvar	4.350	4.410	39.48090	2448514.28		9.41	0.67	$16^{h}45^{m}58.^{s}2$	$+82^\circ02'14''$
82977		UU Oph	EA/SD	A1IV	10.350	>10.540	4.39680	2420750.49		7.18	1.93	$16^{h}57^{m}22.^{s}6$	$-25^\circ47'58''$
83491		V923 Sco	EA/D	F3V	5.989	6.013	34.82690	2441903.69		15.61	0.80	$17^{h}03^{m}50.^{s}9$	$-38^\circ09'09''$
83719		WZ Oph	EA/DM	F8V	9.179	> 9.800	4.18351	2435648.78		7.99	1.37	$17^{h}06^{m}39.^{s}0$	$+07^\circ46'58''$
84479		V2368 Oph	*EA	A2V	6.220	6.420	7.7010	2448506.350	!	5.54	0.86	$17^{h}16^{m}14.^{s}2$	$+02^\circ11'10''$
84500		U Oph	EA/DM	B5Vnn	5.906	6.606	1.67734	2448500.7312		5.38	0.83	$17^{h}16^{m}31.^{s}7$	$+01^\circ12'38''$
84670		TX Her	EA/DM	A9V	8.150	8.950	2.05981	2448500.980		5.55	0.84	$17^{h}18^{m}36.^{s}4$	$+41^\circ53'17''$
84949		V819 Her	EA	F9Vn...	5.670	5.770	2.22970	2448502.0100	!	15.53	1.16	$17^{h}21^{m}43.^{s}6$	$+39^\circ58'29''$
85057	*	V948 Her	EA	F2	9.015	9.306	1.27519	2448501.1070	!	8.31	1.10	$17^{h}22^{m}57.^{s}7$	$+29^\circ20'42''$
86809		V624 Her	EA	A3m	6.240	6.400	3.89498	2448502.410		6.93	0.74	$17^{h}44^{m}17.^{s}2$	$+14^\circ24'36''$
87965		Z Her	*EA/AR	F6V	7.363	> 8.180	3.9928	2448502.500		10.17	0.84	$17^{h}58^{m}07.^{s}0$	$+15^\circ08'21''$
88008		MM Her	EA/AR	G3	9.660	10.640	7.96032	2448504.620		5.42	1.56	$17^{h}58^{m}38.^{s}5$	$+22^\circ08'47''$
88069		V1647 Sgr	EA/DM	A3III	6.960	> 7.550	3.28279	2441829.70		8.70	1.40	$17^{h}59^{m}13.^{s}5$	$-36^\circ56'20''$
89816	*	QS Ser	EA:	G0+...	7.690	8.250			!	16.40	1.83	$18^{h}19^{m}48.^{s}1$	$-04^\circ57'42''$
90313		V2291 Oph	EA	G8III-IV+..	5.783	5.810	385.00000	2447018.18		4.04	0.69	$18^{h}25^{m}38.^{s}8$	$+08^\circ01'55''$
92330	*	V362 Pav	EA	A2mA5-A9	7.436	7.644			!	6.10	0.82	$18^{h}49^{m}03.^{s}5$	$-63^\circ16'10''$
92537	*	V539 Lyr	EA	A0	7.264	7.310			!	3.91	0.55	$18^{h}51^{m}26.^{s}8$	$+39^\circ19'14''$
92835	*	HP Dra	EA	G5	8.060	> 8.360	6.6930	2448500.330	!	12.45	0.72	$18^{h}54^{m}53.^{s}5$	$+51^\circ18'29''$
93104	*	V542 Lyr	EA	B7IV	5.860	5.950	5.8230	2448502		6.32	0.54	$18^{h}58^{m}01.^{s}9$	$+38^\circ15'58''$
93595		BH Dra	EA/SD:	A2Vp+...	8.430	> 8.900	1.81724	2448500.850		5.63	1.45	$19^{h}03^{m}39.^{s}5$	$+57^\circ27'26''$

Table 1

Continued

HIP		Name	Var	Spectral	Max		Min	P	E		π	σ_π	RA	Dec
Number			type	type	[mag]		[mag]	[days]			[mas]	[mas]	2000.0	
93809		V805 Aql	EA/DM	A2 + A7	7.620		8.000	2.40823	2448500.190		5.80	0.87	$19^h06^m18^s.2$	$-11°38'57''$
94335		FL Lyr	EA/DM	G0V	9.466		10.061	2.17809	2448500.2673		7.69	0.89	$19^h12^m04^s.9$	$+46°19'26''$
95588	*	V1455 Aql	EA:	F0	8.081		8.272			!	9.17	1.14	$19^h26^m33^s.2$	$-08°09'42''$
95611	*	V2080 Cyg	EA	F5	7.460		7.870	2.46680	2448500.6200	!	12.60	0.58	$19^h26^m47^s.9$	$+50°08'43''$
96011	*	V2083 Cyg	EA	A3	6.938	>	7.180	1.86742	2448501.1262	!	3.98	0.79	$19^h31^m16^s.4$	$+47°28'53''$
96234		V4089 Sgr	EA	A5IV-III	5.910		6.130	4.6271	2448503.102		7.49	0.88	$19^h34^m08^s.5$	$-40°02'05''$
96620		V1143 Cyg	EA/DM	F6Vasv	5.980		6.430	7.64076	2448501.110		25.12	0.56	$19^h38^m41^s.2$	$+54°58'24''$
96739		V4090 Sgr	EA	A1mA6-F0	6.660		6.910	1 1.41507	2448503.40		11.84	0.97	$19^h39^m55^s.5$	$-39°25'58''$
97263	*	HZ Dra	EA	A0	8.160	>	8.320	0.77294	2448500.7650	!	5.96	0.62	$19^h46^m02^s.5$	$+69°55'09''$
97649	*	α Aql	EA	A7IV-V	0.820		0.869	7.9450	2448502.54	!	194.44	0.94	$19^h50^m46^s.7$	$+08°52'03''$
97849		V505 Sgr	EA/SD	A1V	6.508	>	7.510	1.18287	2448501.1079		8.58	1.38	$19^h53^m06^s.4$	$-14°36'11''$
98118		BS Dra	EA/DM	F5V + F5V	9.190		9.950	3.36401	2448502.320		4.80	0.74	$19^h56^m28^s.8$	$+73°36'58''$
98539		V4428 Sgr	*EA	F3V	8.260		8.530	2.78350	2448502.2300	!	5.49	1.15	$20^h01^m04^s.7$	$-42°10'12''$
98955		V477 Cyg	EA/DM	A3V	8.566	>	9.320	2.34698	2448500.6622		5.22	1.05	$20^h05^m27^s.7$	$+31°58'18''$
100981	*	MP Del	EA	A3	7.624		7.890			!	6.09	0.99	$20^h28^m26^s.6$	$+11°43'14''$
101236	*	MR Del	EA	K0	8.850		9.160	0.52169	2448500.5160	!	22.53	5.13	$20^h31^m13^s.3$	$+05°13'06''$
102037	*	V400 Vul	EA:	A0	6.756		6.823			!	5.82	0.73	$20^h40^m42^s.3$	$+26°04'45''$
102041	*	IO Aqr	EA	G0	8.924		9.344	2.36816	2448502.3278	!	5.42	1.26	$20^h40^m45^s.5$	$+00°56'21''$
102545	*	NN Del	EA	F8	8.490		8.917			!	5.71	1.14	$20^h46^m49^s.2$	$+07°33'11''$
102827	*	V2136 Cyg	EA	B4V	6.300		6.378			!	3.55	0.59	$20^h49^m54^s.6$	$+46°39'41''$
103505		CG Cyg	EA/SD	G9.5V +K3V	10.120		10.770	0.63114	2448500.330		9.25	4.95	$20^h58^m13^s.4$	$+35°10'30''$
103542		KZ Pav	EA/SD	F6V	7.262		7.962	0.94987	2448500.1013		10.12	5.66	$20^h58^m40^s.1$	$-70°25'20''$
104263		V1061 Cyg	EA/D	F8	9.360	>	9.700	2.34664	2448500.6056	!	6.25	1.06	$21^h07^m20^s.5$	$+52°02'58''$
104604	*	BR Ind	EA	F8V	7.075		7.220	0.89277	2448500.4820	!	20.47	2.08	$21^h11^m22^s.8$	$-52°20'22''$
105515		ι Cap	EA	G8III	4.428		4.464			!	15.13	0.80	$21^h22^m14^s.8$	$-16°50'04''$

Table 1

Concluded

HIP Number		Name	Var type	Spectral type	Max [mag]		Min [mag]	P [days]	E		π [mas]	σ_π [mas]	RA 2000.0	Dec 2000.0
105584	*	V2154 Cyg	EA	F0	7.851		8.237	2.63060	2448502.1600	!	11.40	0.97	$21^{h}23^{m}08^{s}.2$	$+48^\circ31'08''$
106024		EI Cep	EA/DM	F2V	7.650		8.160	8.43933	2448500.550		5.03	0.56	$21^{h}28^{m}28^{s}.2$	$+76^\circ24'13''$
106981		EE Peg	EA/DM	A7Vvar	6.997		7.607	2.62817	2448502.2388		7.61	0.91	$21^{h}40^{m}01^{s}.9$	$+09^\circ11'05''$
107083		EK Cep	EA/DM	A1V	7.880		9.060	4.42779	2448500.330		6.53	0.58	$21^{h}41^{m}21^{s}.5$	$+69^\circ41'34''$
107960		AW Peg	EA/DS	A3V	7.630		8.690	1 0.62259	2448500.37		6.25	0.94	$21^{h}52^{m}20^{s}.7$	$+24^\circ00'44''$
108606		CM Lac	EA/DM	A2V	8.220	>	8.800	1.60469	2448500.260		4.40	0.84	$22^{h}00^{m}04^{s}.4$	$+44^\circ33'08''$
108644		FF Aqr	EA/RS:	G5III-IV	9.397		9.677	9.20775	2442752.96		7.91	1.50	$22^{h}00^{m}36^{s}.4$	$-02^\circ44'27''$
108646	*	V441 Cep	EA	A0	8.740		9.223	1.64900	2448500.9300	!	3.57	0.67	$22^{h}00^{m}36^{s}.6$	$+75^\circ04'22''$
108797		DX Aqr	EA/KE:	A0/1V + K1/2	6.430		6.880	0.94501	2448500.4630		6.92	2.17	$22^{h}02^{m}26^{s}.2$	$-16^\circ57'53''$
109354	*	V402 Lac	EA	B9	6.699		6.993	3.7820	2448500.980	!	4.18	0.70	$22^{h}09^{m}15^{s}.2$	$+44^\circ50'47''$
111162		KX Aqr	*EA	F8/G0V	8.232		8.697	2.07441	2448501.5469	!	6.25	1.07	$22^{h}31^{m}13^{s}.4$	$-22^\circ59'48''$
111454	*	LL Aqr	EA	G0	9.327		9.719			!	7.16	1.46	$22^{h}34^{m}42^{s}.1$	$-03^\circ35'58''$
111809	*	VZ PsA	EA	A0V	5.675		5.723			!	7.50	0.76	$22^{h}38^{m}51^{s}.5$	$-33^\circ04'53''$
112317		ZZ Cep	EA/DM	A2p	8.540		9.540	2.14180	2427928.45		5.95	2.57	$22^{h}45^{m}02^{s}.6$	$+68^\circ07'58''$
113442	*	DF Gru	EA	F3/F5V	10.352		10.785	1.40159	2448501.1600	!	6.02	2.79	$22^{h}58^{m}32^{s}.0$	$-42^\circ17'17''$
114206	*	BN Scl	EA	F7V	8.963		9.331	3.6506	2448500.690	!	5.85	1.16	$23^{h}07^{m}42^{s}.8$	$-30^\circ13'60''$
114305	*	V381 And	EA:	A0	7.352		7.417			!	4.79	0.90	$23^{h}08^{m}57^{s}.1$	$+38^\circ54'55''$
114484		RT And	EA/DW	F8Vvar	8.998	>	9.800	0.62894	2448500.3671		13.26	1.13	$23^{h}11^{m}10^{s}.1$	$+53^\circ01'33''$
114639		SZ Psc	*EA/DS	K1IIIv comp	7.380		7.870	3.96579	2448503.170		11.34	0.92	$23^{h}13^{m}23^{s}.8$	$+02^\circ40'31''$
115200		OT And	EA	A0	7.398		7.530			!	4.63	0.86	$23^{h}20^{m}01^{s}.2$	$+41^\circ45'17''$
115990		AR Cas	EA	B3IV	4.840		4.960	6.0663	2448501.820		5.67	0.56	$23^{h}30^{m}01^{s}.9$	$+58^\circ32'56''$
116167		DI Peg	EA/SD	F4IV	9.530		10.680	0.71182	2448500.0280		5.17	1.72	$23^{h}32^{m}14^{s}.7$	$+14^\circ58'09''$
118223	*	V821 Cas	EA	A0	8.273		8.700	1.76975	2448500.4459	!	5.38	0.91	$23^{h}58^{m}49^{s}.2$	$+53^\circ40'20''$

such arguments could be done for well observed systems only. For the sake of using clearly defined selection criteria we have left in the Table all the objects that fulfill our primary criteria.

4 Table Description

Table 1 contains all Hipparcos eclipsing binaries that have their variability types denoted as EA or EA: and that fulfill the following distance condition: the binary must be either nearer than 200 pc or the standard error of its parallax must be five times smaller than the parallax value. In the *Hipparcos Catalogue* we have found 198 eclipsing binaries that fulfill these conditions. 156 of these stars are comprised in the Section "Periodic Variables" of the *Hipparcos Variability Annex* (ESA 1997, Vol. 11) and 42 in the Section "Unsolved Variables" of this *Annex*. The latter Section contains the stars with generally unknown periods. All of them are listed in Table 1 in order of increasing Hipparcos numbers. The columns of Table 1 are generally self-explanatory. Comments must only be given to some of them. The asterisk between the Hipparcos number and the name of the star indicates that the object has been newly-classified in the *Hipparcos Catalogue* on the basis of the Hipparcos observations and the preliminary variability analysis. The asterisk preceding variability type in column 3 denotes that this type was newly classified by Hipparcos. The maximum and minimum magnitudes in columns 5 and 6 of the Table are taken as determined by Hipparcos. Columns 9 and 10 give the parallax value and its standard error in milliarcseconds (mas).

We have also selected a set of poorly observed stars that have neither spectroscopic nor photometric orbit solutions what has been validated by search in the SIMBAD database. Such objects have been marked by exclamation marks between columns 8 and 9.

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